

5.2 Electrolysis of lead(II) bromide

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Molten lead(II) bromide is an electrolyte. It therefore conducts electricity. The electric current is carried through the electrolyte by ions.

Lead(II) bromide is chosen for this experiment because it has a relatively low melting point of 420°C .

Aim

To investigate the electrolysis of molten lead(II) bromide.

Apparatus and materials

Lab pack to supply 10–12 V d.c.
Ammeter with scale to read 3 amps
Three connecting wires
Rheostat, 12 ohm 5 amp
U-tube
Carbon rod
Steel rod
Stand, boss and clamp
Bunsen burner and mat
Spatula
Paper
Lead(II) bromide

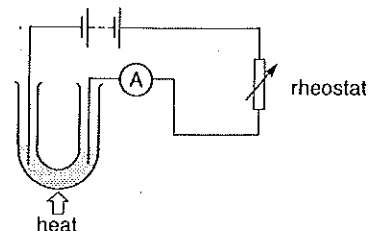
Precaution

Lead(II) bromide and the vapour produced during the experiment are poisonous. The experiment must be carried out in a fume cupboard.

Procedure

Note the ammeter reading at each step of the experiment.

- 1 Place lead(II) bromide in the U-tube to the depth shown in the diagram shown above.
- 2 Heat the bottom of the U-tube to melt the lead(II) bromide. If necessary add more lead(II) bromide to maintain the depth.
- 3 Warm the electrodes by placing in a Bunsen flame for a few seconds and then place them in the molten lead(II) bromide.
- 4 Adjust the rheostat until the ammeter reads 1 amp.
- 5 Note what happens around the anode and cathode.
- 6 Continue heating sufficiently to keep the lead(II) bromide molten.



- 7 After 5 minutes switch off the current and remove the electrodes. Examine the cathode for lead by scraping it against some paper.

Results

Copy and complete the following table:

appearance around anode (positive electrode)	appearance around cathode (negative electrode)

..... was produced at the anode and was produced at the cathode.

Extra work

- Investigate the electrolysis of lead(II) iodide and lead (II) chloride.

Questions

- 1 a) What is the colour of the vapour produced around the anode?
b) What is the appearance of the steel rod at the end of the experiment?
c) How did the reading on the ammeter vary?
d) How is the amount of lead(II) bromide fumes produced in the experiment controlled?
e) How could the speed of electrolysis be increased?
- 2 Predict the products of electrolysis of the following 10 molten compounds. State the electrode at which each is produced.

sodium chloride, calcium iodide, zinc bromide, lithium oxide, sodium sulphide, lead(II) iodide, barium nitride, calcium fluoride, cryolite (sodium aluminium fluoride), sodium hydroxide.